

CLAIMS

WHAT IS CLAIMED IS:

1. A process of removing suspended and dissolved material from fruit and vegetable wastewater comprising the steps of:
 - adding a coagulant polymer to the wastewater creating a charge interaction wherein coagulated solid particles are formed from the suspended and dissolved material in the wastewater;
 - adding a synthetic organic polymer having a known molecular size and weight to the wastewater to neutralize the coagulated solid particles into solid particles having a specific definable and controllable size and weight; and
 - filtering from the wastewater the solid particles having a specific definable and controllable size and weight.
2. The process as recited in claim 1, wherein the coagulant polymer is selected from the group including: an aluminum compound having a charge of +3, an iron based compound having a charge of +3 and a calcium compound.
3. The process as recited in claim 2, wherein the aluminum based compound is selected from the group including: aluminum chloride, aluminum sulfide, poly aluminum chloride and aluminum chlorohydrate.
4. The process as recited in claim 2, wherein the iron based compound is selected from the group including: ferric sulfate and ferric chloride.

5. The process as recited in claim 1, wherein the coagulant polymer is added in an amount that is based upon quantity of TSS, BOD and COD in the wastewater.
6. The process as recited in claim 1, wherein the coagulant polymer is added in an amount that is approximately equal to: $20*((\text{BOD Qty} + \text{COD Qty} + (0.35 * (\text{TSS Qty}))) / 1000)$, wherein the BOD Qty, COD Qty and TSS Qty represent the corresponding amounts of BOD, COD and TSS in the wastewater.
7. The process as recited in claim 1, wherein the coagulant polymer is a basic coagulant polymer when the pH of the wastewater is low and is an acidic coagulant polymer when the pH of the wastewater is high.
8. The process as recited in claim 1, wherein coagulant polymer is added in an amount between 50 to 200 ppm.
9. The process as recited in claim 1, wherein the synthetic organic polymer is a controlled mole weight cation.
10. The process as recited in claim 1, wherein the synthetic organic polymer is selected from the group including: DADMAC, acrylamide and epi-dma.
11. The process as recited in claim 1, wherein the synthetic organic polymer is epi-dma having a low molecular weight.
12. The process as recited in claim 1, wherein the synthetic organic polymer is an organic polymeric backbone of known molecular size and weight.

13. The process as recited in claim 1, wherein the synthetic organic polymer is added in an amount between a 5:1 and 25:1 ratio of coagulant polymer to synthetic organic polymer.
14. The process as recited in claim 1, wherein the synthetic organic polymer is added in an amount between 10 to 50 ppm.
15. The process as recited in claim 1, wherein the coagulant and synthetic organic polymers have a dwell time that is sufficient for the formation of solid particles having a relative tight distribution of solid particle size.
16. The process as recited in claim 15, wherein the dwell time is between 5 and 30 minutes.
17. The process as recited in claim 1, wherein the filtering is performed by a polypropylene filter membrane.
18. The process as recited in claim 17, wherein the wastewater flows through the filter membrane from the outside of the filter membrane to the inside of the filter membrane.
19. The process as recited in claim 1, further comprising the step of adding a pH adjuster to the wastewater to adjust the pH of wastewater and to remove sulfates.
20. The process as recited in claim 19, wherein the pH adjuster is Mg(O).
21. A process of removing suspended and dissolved material from fruit and vegetable wastewater comprising the steps of:

adding an amount of a coagulant polymer to the wastewater creating a charge interaction wherein coagulated solid particles are formed from the suspended and dissolved material in the wastewater,

wherein the amount of coagulated polymer added is approximately equal to: $20*((\text{BOD Qty} + \text{COD Qty} + (0.35 * (\text{TSS Qty}))) / 1000)$, where the BOD Qty, COD Qty and TSS Qty represent the corresponding amounts of BOD, COD and TSS in the wastewater;

adding an amount of a synthetic organic polymer having a known molecular size and weight to the wastewater to neutralize the coagulated solid particles into solid particles having a specific definable and controllable size and weight, wherein the amount of synthetic organic polymer added is between a 5:1 and 25:1 ratio of coagulant polymer to synthetic organic polymer; and

filtering from the wastewater the solid particles having a specific definable and controllable size and weight.

22. The process as recited in claim 21, wherein the coagulant polymer is selected from the following group of compounds: an aluminum based compound having a charge of +3, an iron compound having a charge of +3, and a calcium compound.
23. The process as recited in claim 21, wherein the synthetic organic polymer is selected from the following group of compounds: DADMAC, acrylamide and epi-dma.
24. A process of removing suspended and dissolved material from a continuous stream of fruit and vegetable wastewater comprising the steps of:

adding coagulant and synthetic organic polymers to the continuous stream of wastewater producing a continuous stream of

treated solution containing treated liquid and solid particles having a specific definable and controllable size and weight;

separating the solid particles and treated liquid from the continuous stream of treated solution by using a settling process and producing a continuous stream of treated liquid; and

filtering the continuous stream of treated liquid through a filter membrane resulting in the collection of residual solid particles and a continuous stream of filtered liquid.

25. The process as recited in claim 24, wherein the coagulant polymer is selected from the following group of compounds: an aluminum based compound having a charge of +3, an iron compound having a charge of +3 and a calcium compound.
26. The process as recited in claim 24, wherein the synthetic organic polymer is selected from the following group of compounds: DADMAC, acrylamide and epi-dma.
27. The process as recited in claim 24, wherein the step of adding coagulant and synthetic organic polymers has a dwell time between 5 and 30 minutes.
28. The process as recited in claim 24, wherein the continuous stream of wastewater has a flow rate and the continuous stream treated solution has a flow rate and the two flow rates are equal.
29. The process as recited in claim 24, wherein the continuous stream of wastewater has a flow rate and the continuous stream treated liquid has a flow rate and the two flow rates are equal.

30. The process as recited in claim 24, wherein the residual solid particles collected on the filter membrane act as a separate filter that filters out other residual solid particles and as the residual solid particles accumulate on the filter membrane a fluid flow through the filter membrane is not significantly reduced.
31. The process as recited in claim 24, wherein the wastewater flows through the filter membrane from the outside of the filter membrane to the inside of the filter membrane.
32. A process of removing suspended and dissolved material from a continuous stream of fruit and vegetable wastewater comprising the steps of:

adding coagulant and synthetic organic polymers to the continuous stream of wastewater producing a continuous stream of treated solution containing treated liquid and solid particles having a specific definable and controllable size and weight, wherein the coagulant polymer is selected from the following group of compounds: an aluminum based compound having a charge of +3, an iron compound having a charge of +3, and a calcium compound;

separating the solid particles and treated liquid from the continuous stream of treated solution by using a settling process and producing a continuous stream of treated liquid, wherein the synthetic organic polymer is selected from the following group of compounds: DADMAC, acrylamide and epi-dma; and

filtering the continuous stream of treated liquid through a filter membrane resulting in the collection of residual solid particles and a

continuous stream of filtered liquid, wherein the residual solid particles collected on the filter membrane act as a separate filter that filters out other residual solid particles and as the residual solid particles accumulate on the filter membrane a fluid flow through the filter membrane is not significantly reduced.

33. The process as recited in claim 32, wherein the step of adding coagulant and synthetic organic polymers has a dwell time between 5 and 30 minutes.
34. The process as recited in claim 32, wherein the continuous stream of wastewater has a flow rate and the continuous stream treated liquid has a flow rate and the two flow rates are equal.
35. A product for consumption by animals wherein the product is rendered from solid particles having a specific definable and controllable size and weight, and wherein the solid particles are generated from a process that removes suspended and dissolved material in fruit and vegetable wastewater using coagulant and synthetic organic polymers.